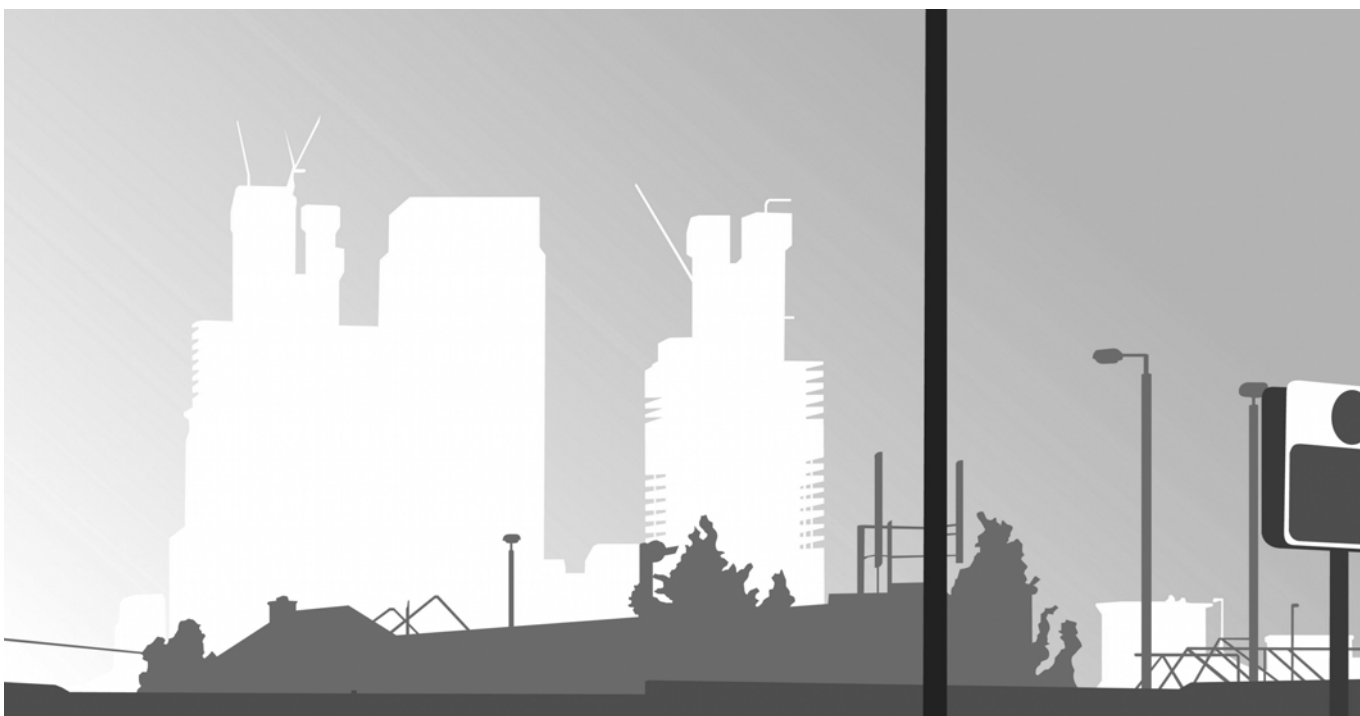


Transformers and Relays

Asset Management

Linking the overall computerized asset management system down to the relay in the field...is the major breakthrough

in system reliability since the introduction of the microprocessor relay and automated relay testing **BY JOE STEVENSON**



We've moved skillfully into the 21st century when at the close of the 20th we thought we could see the end-all of catastrophes because of Y2K. Moving ahead in this post-9/11 world, many of us were preoccupied until incredible coincidence last August reminded us once again how tenuous our relationship with technology can be. Going

forward, realistic circumstances must include examination of even the fantastical if the stewards of the nation's electric grid are to ensure its reliability, especially now with control spread widely among so many different stakeholders. Gone are the "good 'ole days" in many ways, indeed.

None of this is news; but the story

here is how the power industry-affecting virtually all aspects of our lives today, with an infrastructure on life support and a narrowing, downsized and aging workforce—can adapt. Automation technology might help, but companies now are somewhat wary; they've bought software and computerized equipment in the past and upgrading from what they've

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ENOSERV PowerBase (ENOSERV) The PowerBase substation settings management system is designed to help power companies aggregate, customize and securely store & deliver critical engineering data & field service records. Access to data via an identity-enabled portal can facilitate User management. Organize & track all substation asset data including relay settings while automating with other programs like Aspen 1-Liner, CAPE, Cascade, SEL and RTS.

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Cascade Asset Health Management

Software (Digital Inspections) This software gives reliability and maintenance professionals tools to accurately monitor and access equipment performance and lifecycle.

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Maximo ITSM (MRO Software) With five key management systems — asset management, service management, work, contract and procurement management - Maximo ITSM efficiently captures and reconciles asset, configuration, contract, financial, resource and service data.

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already implemented and established as system-wide practice creates political and logistical problems. Besides, new technology costs money and the payoff takes time—neither of which is in great supply these days. So what is the solution? For many companies, it's integration.

Since the dawn of the first chipped wheel, manufacturers have done things differently. Products competing in the market ever since give the consumer perceived benefits in terms of design, function, price, etc., of one make over another. By now in our ever-widening economy, particularly as applied in the electric power industry, choice is present but conspicuously absent in the view of many power companies is a universal solution when it comes to automation. For those companies the belief is that, given the complexity of the processes involved in delivering the product, there simply isn't one "off the shelf" software solution. The power companies then take on the task themselves of trying to integrate their disparate systems into what they want with, again, fewer human and financial resources.

In this new era of microprocessor technology, automation has certainly been beneficial. Gone are many of the manual processes of the past; in the wake however, is a whole new set of redundant, time-consuming steps necessary to maintain the data exchange between automated systems, particularly so wherever software meets hardware in terms of computerized equipment and the data exchange between assets. Typically, there is no communication between products from different manufacturers and so O&M personnel are shackled to projects of creating useful information exchanges between assets, which in turn takes their attention and time away from their focus of maintaining system reliability.

Take relay testing as an example. Relay technicians and engineers represent a core human asset for ensuring system reliability. At their disposal are the relays themselves which today are still by proportion largely electromechanical but are increasingly being replaced with microprocessor-based relays. Microprocessor relays perform several protection functions previously impossible from just one device, bringing with them a whole new level of functionality and complexity. Testing to ensure they're

programmed properly with the correct settings, and that they're used in the proper applications, raises the importance of the scope of work that protection engineers and technicians do.

Testing relays requires the use of a secondary injection unit, or test set, that applies currents and voltages into the relay from which the relay technician can make a determination on its condition. The results of the test get recorded and if the relay requires adjustment or settings changes, then the technician calibrates or programs the relay accordingly. The technician must be knowledgeable on power, relays, the test set, and the settings as applied to the relay and what they mean in order to perform tests and maintenance confidently. Likewise, the protection engineer who initiated the settings must also use his or her background in power and apply it to the scheme within which the protective relay functions in order to create settings that make sense.

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Straightforward as the process of relay testing sounds, the critical component to it is the results; or rather, how the test data gets turned into useful information about the condition of the system's reliability. Historically, when testing electromechanical relays manually for example, the technician powered up the test set and hand-calculated values expecting the relay to operate within that pre-determined range. If it did not, it got adjusted or pulled out of service. What guided the whole testing process were the paper setting sheets from the engineer and the paper test forms and reports the technician completed during and after testing. Following the testing process, the reports got filed back at the office, probably with the setting sheets. The test forms stayed out in the field at the substation.

With the paper system, engineers reviewed reports and setting sheets line-by-line, page-by-page. Hours could turn into days spent on reviewing the records, particularly whenever an error (like a transposition) got detected and correcting it meant revisiting each record affected. Technicians also labored through the manual system in the field spending valuable time deciphering paperwork as a necessary step in the whole testing process.

Today, the process is different. With automated testing, the laptop computer and the various automated relay testing software systems [like AVTS (Megger), RTS (ENOSERV), ProTest (Doble), MasterTest (Manta), Omicron, et al] have replaced the labor-intensive processes of the paper system. Now, historical records and settings can be backed up to a database affording both engineers and technicians more time to get on with their core functions involved in maintaining system reliability. The advent of the microprocessor relay made automated relay testing compulsory though, and so both engineers and technicians alike had to learn the new technology to keep up while the industry entered the digital age.

Automated testing and the microprocessor-based relay have been around for over a decade now and while advances surrounding the whole process of relay testing have emerged and have been widely incorporated into reliability maintenance throughout the industrialized world, there still remains several critical problems. With more demand than ever on technicians and engineers to be knowledgeable in computer science, and with much (if not all) of that training only available on-the-job, the need to maintain a capable workforce comes at a price...in real dollars. Asset managers must leverage human, financial, and physical assets all the time. The problem is finding the resources to keep personnel technologically knowledgeable in a fast-paced climate; the challenge is cultivating knowledge and knowing where it counts most.

Going further, there's a data gap between disparate software systems. Even computer-savvy personnel hit dead ends trying to get different systems to talk. In the case of relay testing, each test set manufacturer has its own software and with a crew of technicians using test

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sets from different manufacturers, the test settings, test results, etc., must be backed up to different databases in different ways. The protection engineer is left to sort through data from different locations to assess the condition of the electric system under his watch.

Companies have spent millions working on in-house systems to integrate their software resources, and largely those applications provide only a rudimentary way of exchanging data. The whole point of automation is to eliminate manual steps and create useful information from data. The big problem of software in this industry shows itself at those times when the different systems must be "tweaked" in order to make them useful to personnel who have come to rely on them in order to get their work done.

In this time of constrained budgets and fewer human resources, outsourcing data integration to third-party software companies pays off. Companies taking advantage of "off-the-shelf" applications like Cascade (Digital Inspections), Maximo (MRO), and PowerBase (ENOSERV) avoid the financial pitfalls widely associated with homegrown systems. In terms of relaying, solutions currently exist in the marketplace to maintain and track all relay data from the device in the field to the overall, enterprise-wide asset management system. Relay technicians and engineers have historically been isolated in the sense that the records they must maintain wind up in their own location on the server that only a handful of people even know about. Linking the overall computerized asset management system down to the relay in the field, and automating all processes associated with testing and maintenance in-between, is the major breakthrough in system reliability since the introduction of the microprocessor relay and automated relay testing.

Companies taking advantage of commercially available integration solutions remedy problems of time constraints and benefit by seeing return on investment contribute to long-term profitability. Available integration software, like RTS and PowerBase, even communicates with older test equipment, lengthening existing asset lifespans, keeping tools relevant and useful. Saving-making-time and money is what automation is all about; the loaded benefit is any

system that is easy to use and can bridge any data gaps.

Leveraging asset maintenance with existing resources is the ongoing challenge facing the electric power industry. At the heart of the issue is reliability, but today's industry is wrought with organizational and political characteristics not seen before in history. What effect will new policy have on the grid? All that is known is that there is a certain threshold the industry is approaching and beyond that, it's essentially anyone's guess as to how the industry will respond to ever-increasing demand and costs with a labor pool that is ever-shrinking. Today, at least in relay protection, the solutions are available for purchase in the marketplace.